CLAIMS

1. A method of liquefying and dispersing crystalline wax in a petrochemical mixture, comprising the steps of:

(a) chemically treating the crystalline wax in the petrochemical product to reduce the surface tension of the crystalline wax, converting it to an amorphous form of wax; and

(b) dispersing the amorphous wax in a diluent.

2. The method of **Claim 1**, wherein there is further included in step "a" the step of:

treating the crystalline wax in the petrochemical mixture with a surface active agent having a surface tension in water in the range of about 10 to about 48 dynes per cm, reducing the crystalline wax's surface tension.

3. The method of **Claim 1**, wherein there is further included in step "a" the step of:

treating the crystalline wax in the petrochemical mixture with a surface active agent having a surface tension in water in the range of about 15 to about 32 dynes per cm, reducing the crystalline wax's surface tension.

4. The method of **Claim 1**, wherein the crystalline wax is contained in slop oil, and there is further included in step "b" the step of:

using crude oil as the diluent.

5. The method of **Claim 4**, wherein there is further included the step of:

mixing the slop oil with its wax in amorphous form and the crude oil together, forming a homogeneous mixture.

6. The method of **Claim 2**, wherein the crystalline wax is contained in slop oil, and there is further included in step "b" the step of:

using crude oil as the diluent.

7. The method of **Claim 6**, wherein there is further included the step of:

mixing the surface active agent, the slop oil and the crude oil together at ambient temperature, forming a homogeneous mixture.

8. The method of **Claim 7**, wherein there is further included the step of:

maintaining the homogenous mixture of the surface active agent, the slop oil and the crude oil together at ambient temperature.

9. The method of **Claim 8**, wherein there is further included the step of:

transporting from a production source to a location remote thereto the homogenous mixture of the surface active agent, the slop oil and the crude oil together at ambient temperature.

10. The method of **Claim 6**, wherein there is further included the step of:

concurrently mixing in a degreaser in the combined amorphous wax and diluent.

11. The method of **Claim 6**, wherein there is further included the step of:

concurrently mixing in a corrosion and scale formation inhibitor in the combined amorphous wax and diluent.

12. The method of **Claim 6**, wherein in step "b" the diluent is a refined petroleum product, and in step "b" there is further included the step of:

using said surface active agent as a cloud point lowering, dehazer in the combined amorphous wax and refined petroleum product.

13. The method of **Claim 6**, wherein in step "b" the diluent is a refined petroleum product, and in step "b" there is further included the step of:

using said surface active agent as a pour point lowering agent in the combined amorphous wax and refined petroleum.

14. The method of **Claim 1**, wherein the diluent is crude oil, and wherein there is further included the steps of:

treating the crystalline wax with a treatment chemical to reduce the surface tension of the crystalline wax producing the amorphous wax; and

mixing the amorphous wax and crude oil, and retaining the treatment chemical in the mix to inhibit the formation of slop oil out of the crude oil.

15. The method of **Claim 14**, wherein there is further included the step of:

transporting the mixture of the treatment chemical, the amorphous wax and the crude oil together at ambient temperature.

16. The method of **Claim 14**, wherein there is further included in step "a" the step of:

concurrently mixing in with the surface active agent at least one further agent from the group consisting of –

a degreaser, a demulsifier, a corrosion inhibitor, and a scale formation inhibitor,

with the treatment chemical in the combined amorphous wax and crude oil mixture.

17. The method of **Claim 14**, wherein there is further included the step of:

using the surface active agent as either a cloud point or a pour point depressant.

18. The method of **Claim 14**, wherein there is further included the step of:

mixing the treatment chemical with the crystalline wax and crude oil at the crude oil production source.

19. The method of **Claim 2**, wherein there is further included the step of:

using as the surface active agent a homogeneous mixture including about 25% to about 99.9% by weight the surface active agent.

20. The method of **Claim 2**, wherein there is further included the step of:

including with the surface active agent in a homogeneous mixture –

– about 15% to about 35% by weight butyl cellosolve; and

– about 5% to about 15% by weight of pine oil and a mixed catalyst solution made of saturated higher fatty acids, an alkyl phenol and an oil-water soluble copolymer of partially sulfonated, maleic anhydride and polystyrene with a molecular weight ranging from about 2,000 to about 2,000,000.

21. The method of **Claim 20**, wherein there is further included the step of:

using a catalyst mixture in a range of about 0.5% to about 5% by weight.

22. The method of **Claim 19**, wherein there is further included the step of:

using as the surface active agent a nonionic polyethoxylated compound.

23. The method of **Claim 22**, wherein there is further included the step of:

using as the surface active agent a product derived from polyethylene oxide.

24. The method of **Claim 2**, wherein the surface active agent is a nonionic surfactant, and wherein there is further included the step of:

using, as a chemical composition mixture, a by-weight percent of the nonionic surface active agent of about 48%, with about 32% butyl cellosolve and about 17% pine oil acting as degreaser, about 2% of a mixture containing about 70% higher fatty acids, about 29% a copolymer of maelic anhydride and polystyrene and about 1% of catechol serving as a corrosion inhibitor.

25. The method of **Claim 1**, wherein there is further included the step of:

adding a nonionic surface active agent, a hydrotrope–demulsifier, a chelating agent and a wax plasticizer.

26. The method of **Claim 25**, wherein there is further included, in the adding of the hydrotrope–demulsifier, chelating agent and the wax plasticizer, the steps of:

adding the chelating agent in a range of about two to about twenty-five (2 to 25%) percent and the hydrotrope–demulsifier in the range of about five to about fifty (5 to 50%) percent and the plasticizer in a range of about five hundredths to about sixty-five (0.05 to 65%) percent, resulting in the additions reaching one hundred (100%) percent , producing in a mixture that allows crystalline wax or low A.P.I. gravity asphalt residue emulsion to become solubleized (dispersed) in a crude oil diluent with a complete separation of hydrocarbons, water and solids, producing a three-phase separation.

27. The method of **Claim 25**, wherein there is further included the step of:

adding as the hydrotrope–demulsifier, at least one of the chemical ingredients from the group consisting of –

a. Sodium Xylene Sulfonate;

b. Sodium Dodecyl Sulfonate;

c. Sodium Cumene Sulfonate;

d. Ammonium Cumene Sulfonate;

e. Sodium Napthalene Sulfonate; and

f. Sodium Napthenic Acid Sulfonate.

28. The method of **Claim 25**, wherein there is further included the step of:

adding as the chelating agent, at least one of the chemical ingredients from the group consisting of –

a. Ethylenediamine tetraacetic acid (Versene);

b. Sodium salt of Ethylenediamine tetraacetic acid;

c. Nitrilotriacetic acid (NTA); and

d. Polymeric chelating agent derived from copolymers of acrylic and maleic acids.

29. The method of **Claim 25**, wherein there is further included the step of:

adding as the wax plasticizer, at least one of the chemical ingredients from the group consisting of –

a. tributoxyethylphosphate (KP-140);

b. tributyl phosphate;

c. tri-isobutyl phosphate;

d. tris (2-ethylhexy) phosphate Flexol TOF (Reomol TOF);

e. tricresyl phosphate;

f. dioctylpthalate;

g. diethyl pthalate;

h. di-(2-ethylhexyl) adipate - Flexol-A-26;

i. di-(n-hexyl) phthalate - Flexol DHD;

j. di-(2-ethylhexyl) phthalate - Flexol DOD;

k. diethyleneglycol, dibenzoate - Flexol 2GB;

l. triglycol di (2-ethylbutyrate) - Flexo 3GH;

m. polyethylene, 200 di (2-ethyl hexoate) - Flexol 4GD;

n. triglycol di (2-ethylhexoate) - Flexol 3GO; and

o. di (2-ethylhexyl) tetratrihydrophtalate - Flexol - 8HP.

30. A chemical mixture, comprising:

wax, originally in crystalline form, but converted to an amorphous form due to the presence of an additive including a nonionic surface active agent, a hydrotrope–demulsifier, a chelating agent and a wax plasticizer.

31. The chemical mixture of **Claim 30**, wherein:

said nonionic surface active agent is a nonionic polyethoxylated compound.

32. The chemical mixture of **Claim 31**, wherein:

said nonionic polyethoxylated compound is a product derived from polyethylene oxide.

33. The chemical composition of **Claim 30**, wherein:

said surface active agent represents about 48% by weight;

and there is further included:

about 32% butyl cellosolve and about 17% pine oil, about 2% of a mixture containing about 70% higher fatty acids, about 29% a copolymer of maelic anhydride and polystyrene and about 1% catechol.

34. A method of liquefying and dispersing crystalline wax in a petrochemical mixture, comprising the steps of:

(a-i) chemically treating the crystalline wax with a surface active agent of a nonionic surfactant that is made up of up to about 99.9% by weight of a nonionic surfactant and down to about 0.1% by weight of a surface tension depressant, thereby converting the crystalline wax to an amorphous form of wax;

(a-ii) further, concurrently treating the dispersing crystalline wax in the petrochemical mixture with a hydrotrope–demulsifier, a chelating agent and a wax plasticizer; and

(b) dispersing the resultant amorphous wax in a diluent.

35. The method of **Claim 34**, wherein there is further included in step "a-i" the step of:

using a nonionic polyethoxylate surfactant as the nonionic surfactant.

36. The method of **Claim 34**, wherein there is further included in step "a-i" the step of:

using a flouronated hydrocarbon alcohol as the surface tension depressant.

37. The method of **Claim 34**, wherein there is further included in step "a-i" the step of:

using a nonionic surfactant having a H.L.B. number ranging from about ten to about eleven and a half (10-11.5).

38. The method of **Claim 34**, wherein there is further included in step "a-i" the step of:

using a nonionic surfactant having a surface tension in water in the range of about 10 to about 48 dynes per cm, reducing the crystalline wax's surface tension, causing it to be converted to amorphous wax .

39. The method of **Claim 35**, wherein there is further included in step "a-i" the step of:

using a nonionic polyethoxylated compound as the nonionic urfactant.

40. The method of **Claim 39**, wherein there is further included in step "a-i" the step of:

using a product derived from polyethylene oxide as the nonionic polyethoxylated compound.

41. The method of **Claim 35**, wherein there is further included in step "a-i" the step of:

also adding with said nonionic polyethoxylated compound in a homogeneous mixture –

– about 15% to about 35% by weight butyl cellosolve,

– about 5% to about 15% by weight of pine oil and a mixed catalyst solution made of saturated higher fatty acids, an alkyl phenol and an oil-water soluble copolymer of partially sulfonated, maleic anhydride and polystyrene with a molecular weight ranging from about 2,000 to about 2,000,000.

42. The method of **Claim 34**, wherein the crystalline wax is contained in slop oil, and there is further included in step "b" the step of:

using crude oil as the diluent.

43. The method of **Claim 34**, wherein there is further included in step "a-i" the step of:

concurrently mixing in with the surface active agent at least one additional agent from the group consisting of –

a degreaser, a demulsifier, a corrosion inhibitor, and a scale formation inhibitor,

with the treatment chemical in the combined amorphous wax and crude oil mixture.

44. The method of **Claim 43**, wherein there is further included in step "a-ii" the step of:

concurrently mixing in with the surface active agent a mixture of the chelating agent in a range of about two to about twenty-five (2 to 25%) percent and the hydrotrope–demulsifier in the range of about five to about fifty (5 to 50%) percent and the plasticizer in a range of about five hundredths to about sixty-five (0.05 to 65%) percent, resulting in the additions reaching one hundred (100%) percent , producing in a mixture that allows crystalline wax or low A.P.I. gravity asphalt residue emulsion to become solubleized (dispersed) in a crude oil diluent with a complete separation of hydrocarbons, water and solids, producing a three-phase separation, with the treatment chemical in the combined amorphous wax and crude oil mixture.